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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/866,038	05/24/2001	Douglas J. McKnight	075115.0332	4266
23640	7590	04/21/2004	EXAMINER	
BAKER BOTTS, LLP			CHOWDHURY, TARIFUR RASHID	
910 LOUISIANA			ART UNIT	
HOUSTON, TX 77002-4995			PAPER NUMBER	

2871

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/866,038	Applicant(s) MCKNIGHT ET AL.	
	Examiner Tarifur R Chowdhury	Art Unit 2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-6, 8-13, 18-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-6, 8-13 and 18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/17/04 has been entered.

Claim Objections

2. Claim 23 is objected to because of the following informalities: In claim 23, line 1, "a method for a liquid crystal display device" should be changed to --a method of manufacturing a liquid crystal display device--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 4-6, 8-13, 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonehara et al., (Sonehara), USPAT 5,361,151 in view of Wai-Leung Yeung (Wai), JP 2000-89221.

6. Sonehara discloses and shows in Figs. 1 and 2, a liquid crystal display device comprising:

- a first substrate (101) that is substantially transparent;
- a second substrate (103) having a reflector (102) (applicant's substantially reflective surface), the second substrate being substantially parallel with the first substrate (101) and at a distance d from the first substrate;
- a liquid crystal fluid (104) having a birefringence (Δn), the liquid crystal fluid located between the first (101) and second substrates (103), whereby the liquid crystal fluid has a thickness of approximately the distance d , wherein the product of the birefringence and the distance (Δnd) is selected from about 0.13- 0.40 μm (col. 10, lines 20-31) (overlaps the claimed range);
- the first substrate (101) having a first liquid crystal alignment layer (not shown) proximate to the liquid crystal fluid, the first liquid crystal alignment layer having a first orientation direction (col. 3, lines 44-63);
- the second substrate (103) having a second liquid crystal alignment layer (not

shown) proximate to the liquid crystal fluid, the second liquid crystal alignment layer having a second orientation direction, wherein the first and second orientation directions are selected for a twist angle (Φ) of the liquid crystal fluid of about 63° (col. 3, lines 44-66);

wherein substantially linear polarized light is incident to the first substrate (101), the linear polarized axis of the incident light is at a polarization input angle β , wherein the polarization input angle β is selected from about 0° to 90° (overlaps the claimed range at $0^\circ - 13^\circ$) of the first orientation direction;

wherein the polarization of the incident linear polarized light changes as it goes through the liquid crystal fluid and is elliptically polarized at the second substrate (103) and has a first ellipticity, whereby the elliptically polarized light is reflected back by the second substrate reflective surface to the first substrate, and whereby the reflected light is elliptically polarized at the first substrate and has a second ellipticity (col. 4, lines 6-24).

The only difference between Sonehara and the claimed invention is that the twist angle of the instant invention is in the range of 70 degrees to about 90 degrees.

Wai discloses a reflective liquid crystal display wherein the optimum value of the twist angle of the liquid crystal layer is in a range of 67 degrees to 83 degrees (overlaps the claimed range at 70-83 degrees), a polarizer angle is in a range of $5^\circ - 21^\circ$ and retardation is in a range of 0.18-0.28. Wai also discloses such optimum values improve performance of the liquid crystal display (abstract).

Wai is evidence that ordinary workers in the art would find a reason, suggestion or motivation to use a liquid crystal layer having a twist angle in the range of 67° to 83°.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the display device of Sonehara by using a liquid crystal fluid having a twist angle in the range of 67° to 83° (overlaps the claimed range) so that performance of the display device is improved, as per the teachings of Wai.

Accordingly, claim 19 would have been obvious.

As to claim 22, Sonehara also discloses that the optimum LC thickness is less than 2 μm (overlaps the claimed range) (col. 5, lines 11-12).

As to claim 23, since the method of manufacturing the liquid crystal display device merely recites providing/locating each element and each element must be provided/located to form the device, the method of manufacturing would be inherent to the device.

As to claims 20 and 24, Sonehara discloses (col. 3, lines 44-49; 66-67) and shows in Fig. 2 that an incident light (206) is converted to linearly polarized light by a polarizing element. Light (206) is incident at a polarizing plate at angle (205) between an LC molecule director (203) on the light input side and an electric field surface (204). Thus it is clear from the description of Sonehara that the polarizer is positioned between a light source and the first substrate, the polarizer receives light from the light source and linear polarizes the light to the first substrate, wherein the polarizer axis is substantially aligned with the polarization input angle β .

As to claims 21 and 25, since the structure of the modified display device is similar to the structure of the claimed display device, it would have been obvious to one of ordinary skill in the art that when an electric field is varied from substantially no electric field to an electric field of an optimum value between the first and second substrates, shades of gray would be produced.

As to claim 4, Sonehara also discloses that the second substrate (103) comprises a plurality of reflective pixel electrode (102) (col. 3, lines 35-36).

As to claim 5, forming an integrated circuit on the substrate is common and known in the art and thus would have been obvious to avail a proven technique to optimize device performance.

As to claim 6, Sonehara further discloses that the first substrate is transparent and comprises a transparent electrode (105) (col. 3, lines 31 and 33-34).

As to claim 8, Sonehara discloses that a polarizer beam splitter can be used as a polarizing element (col. 5, lines 28-29).

As to claims 9 and 13, using a field-sequential light source which separately provides a plurality of different colored light over time which correspond to separate color fields is common and known in the art and thus would have been obvious to obtain a light source that can display red, green and blue with one pixel and thus have high precision and high brightness characteristics. Further using sequential period of about 8 milliseconds are known in the art and thus would have been obvious to optimize performance.

As to claim 10, using a light source that comprises three differently colored LEDs, which are sequentially, and separately turned on is common and known in the art and thus would have been obvious to produce a multicolor image with a microdisplay that produces monochrome images.

As to claim 11, positioning a lens to receive the reflected light is common and known in the art and thus would have been obvious for several reasons such as to efficiently emanated the reflected light to the front in a scattered manner.

As to claim 12, housing the liquid crystal display within a head mounted display is considered as intended use and thus would have been obvious.

As to claim 18, Sonehara discloses that integral multiples of 90 degrees are added to the polarization input angle β (col. 4, lines 29-30).

Response to Arguments

7. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

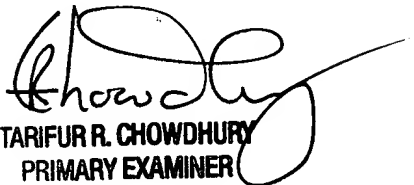
8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tarifur R Chowdhury whose telephone number is (571) 272-2287. The examiner can normally be reached on M-Th (6:30-5:00) Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TRC
April 15, 2004


TARIFUR R. CHOWDHURY
PRIMARY EXAMINER